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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/713,212	11/17/2003	J. Christian Swindal	1857.2020000	2451
26111	7590	11/23/2005	EXAMINER	
STERNE, KESSLER, GOLDSTEIN & FOX PLLC 1100 NEW YORK AVENUE, N.W. WASHINGTON, DC 20005			DETSCHER, MARISSA	
			ART UNIT	PAPER NUMBER
			2877	

DATE MAILED: 11/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/713,212	SWINDAL, J. CHRISTIAN	
	<b>Examiner</b>	<b>Art Unit</b>	
	Marissa J. Detschel	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 November 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☒ Claim(s) 9 and 12 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date: _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>02/28/2005</u>  | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Information Disclosure Statement***

The information disclosure statement filed on February 28, 2005, has been fully considered by the examiner.

### ***Claim Objections***

Claim 9 is objected to because of the following informalities: The phrase "a SLD" should be "an SLD."

Claim 12 is objected to because of the following informalities: The phrase "0.5mm" should be "0.5 mm."

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by Matsugu et al. (USPN 5,114,236).

As to claim 1, Smith discloses a system in a portion of a lithography device comprising:

A system support (5, 100);

A superluminescent device (SLD) (9) coupled (by way of 10a) to said support (column 17, lines 27-35); and

A sensor (8, 9) coupled (by way of 10a) to said support,

Wherein light output by said SLD and diffracted from a target is received by said sensor so as to measure a position of the target (Abstract).

As to claim 2, the light of Matsugu's device has a longitudinal coherence length that substantially eliminates interference from at least one of ghost and spurious reflections with the desired measurement beams. Smith's device uses a low coherent light source to suppress unwanted light resulting from scattered light diffracted from off the surface of the target. (column 16, lines 41-46)

Regarding claim 2, the position of the target in Matsugu's device is determined using interferometry. The signal corresponding to the intensity of the distributions of the received light beams from the device is a representation of an interferometric signal. (column 4, lines 52-55)

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 8, 11, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holzapfel et al. (USPN 5,648,658).

Holzapfel discloses a method for generating position-dependent signals that can be used in photolithography copy processes that involves

diffracting light (from L) from a target (A) to produce +/- first order diffracted beams;  
combining the +/- first order diffracted beams (at D+1, D-1); and

determining an interference pattern generated from the combining of the beams (column 5, lines 12-15).

Holzapfel does not teach the use of superluminescent light as being diffracted from the target. The light is disclosed as being one of short coherence length, such as an LED. The superluminescent light source used in applicant's invention is one that emits short coherence length light. Therefore, the LED and the superluminescent light diffract the same type of light (short coherence length light) off the target being tested. The superluminescent light of Applicant's device is brighter than that of the short coherence light of the LED of Holzapfel. It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the short coherence length light source (LED) of Holzapfel's device with a superluminescent light device (SLD) in order to increase the signal to noise ratio in the measurement device, due to the brighter superluminescent light, resulting in more accurate results.

Regarding claim 13, Holzapfel teaches the use of a grating constant (i.e. a measurement of the layout of spacing of optical elements of a grating) that allows for the interference of diffracted beams of various orders to occur. (column 7, line 66 to column 8, line 7) The beams diffract into various orders due to incoherent superposition (column 5, lines 19-25). The small grating constant allows for the diffracted beams to have a small optical path difference so that the incoherence of the light source does not significantly reduce the interference. (column 7, line 66 to column 8, line 7) Therefore, the spacing must be larger than the coherence length of the light to avoid this outside interference from happening.

In regards to claim 11, Holzapfel teaches a method of generating an optical path difference that is greater than the coherence length of the light source by displacing an optical element and a target (A and M). This allows the beams split into various diffractive orders to not interfere with each other. (column 5, lines 45-47)

Claims 3 and 4 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Matsugu et al. (USPN 5,114,236) as applied to claim 1 above, and further in view of Holzapfel et al. (USPN 5,648,658).

Regarding claim 3, Matsugu does not disclose the use of optical elements positioned between the SLD and the target, wherein a coherence length of the light is less than the smallest spacing between the optical elements. Holzapfel teaches the use of a grating constant (i.e. a measurement of the layout of spacing of optical elements of a grating) that allows for the interference of diffracted beams of various orders to occur. (column 7, line 66 to column 8, line 7) The beams diffract into various orders due to incoherent superposition (column 5, lines 19-25). The small grating constant allows for the diffracted beams to have a small optical path difference so that the incoherence of the light source does not significantly reduce the interference. (column 7, line 66 to column 8, line 7) Therefore, the spacing must be larger than the coherence length of the light to avoid this outside interference from happening. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the small grating constant of Holzapfel's optical element to reduce spurious interference of the diffracted beams, resulting in a more accurate measurement.

In regards to claims 4, Matsugu does not disclose the use of optical elements positioned between the SLD and the target, wherein a coherence length of the light is less than an optical

path difference of the optical elements. Holzapfel teaches a method of generating an optical path difference that is greater than the coherence length of the light source by displacing an optical element and a target (A and M). This allows the beams split into various diffractive orders to not interfere with each other. (column 5, lines 45-47) It would have been obvious to one of ordinary skill in the art at the time the invention was made to use this displacement of an optical element and a target to create interference signals from the various diffractive orders that are free from interference of the other unwanted orders, creating a more accurate measurement.

Claims 5, 7, 9, 10, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsugu et al. (USPN 5,114,236) as applied to claims 1 and 2 above and Holzapfel et al. (USPN 5,648,658) as applied to claim 8 above, and further in view of Alphonse et al. (USPN 4,821,277). Neither Matsugu nor Holzapfel disclose the specifics of the superluminescent device used in their position detecting devices. Alphonse discloses a superluminescent diode (superluminescent device) that presents the specifics of the technology behind the device.

As to claims 5 and 10, Alphonse discloses that SLDs are typically made with an antireflection coating formed on the end surfaces that prevent lasing (column 1, lines 45-47).

As to claims 7 and 12, Alphonse discloses that SLDs provide a power output of a coherence length of less than 200 micrometers (column 1, lines 41-44).

As to claim 9, SLDs provide superluminescent light.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the SLD of Alphonse in the devices of Matsugu and Holzapfel because the technology of the SLD presented is well known in the art.

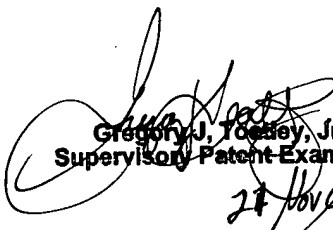
***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marissa J. Detschel whose telephone number is 571-272-2716. The examiner can normally be reached on M-F 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr. can be reached on 571-272-2059. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Marissa Detschel  
November 17, 2005  
MJD

  
Gregory J. Toatley, Jr.  
Supervisory Patent Examiner  
21 Nov 05